Current Status Of Reporting Estimated Glomerular Filtration Rate (eGFR) for Adults

Chronic kidney disease (CKD) is asymptomatic until substantial kidney damage has occurred. Consequently, many people with advanced kidney disease do not get identified nor treated until the disease has progressed to near end stage kidney failure. The public health goal of the National Kidney Disease Education Program (NKDEP) is to improve earlier identification of patients with CKD so they can be put on treatment to slow progression and reduce complications of the disease. The NKDEP recommends to report eGFR along with serum (or plasma or whole blood) creatinine because an eGFR value is more easily related to a patient's kidney disease condition than is a creatinine concentration. The typical upper reference interval for creatinine corresponds to loss of approximately half of kidney function for many demographic groups. There is evidence that reporting eGFR helps to identify patients who need to be treated for CKD. A large Canadian study reported a 68% increase in the rate of first referral to a Nephrologist after starting eGFR reporting (1).

The general chemistry C-B Survey, June 2011, included questions regarding practices for reporting eGFR from serum creatinine results for adult patients. Of the 4655 laboratories that responded, 84% were reporting eGFR as recommended by the NKDEP (Figure 1). Figure 2 shows that 82% reported eGFR with all creatinine results which is recommended when a computer reporting system cannot identify specific subsets of patients for whom reporting eGFR is or is not appropriate. In this situation, the clinician is able to determine the suitability of an eGFR result for a patient's condition. There are clinical conditions when selective reporting of eGFR is appropriate as practiced by 18% of respondents. For example, the patient must be in a stable metabolic state for creatinine to be a useful biomarker for GFR. Consequently, eGFR may not be useful for some inpatients and those with acute kidney injury.

Figure 1. Trend in reporting eGFR

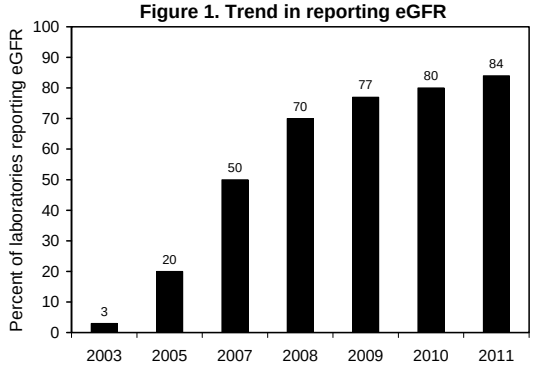
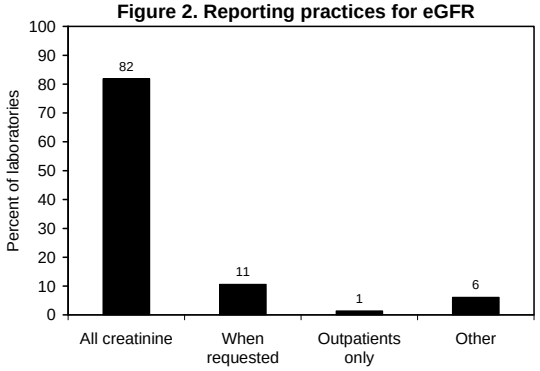
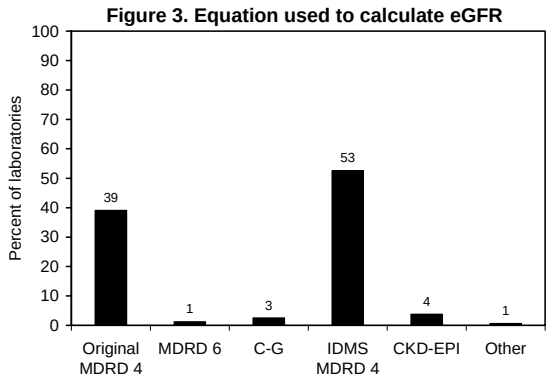


Figure 2. Reporting practices for eGFR



The NKDEP web site cautions that there are also clinical conditions when alterations in the rate of production of creatinine from muscle makes creatinine less reliable as an indicator of kidney function. These conditions include: very large or very small body size or muscle mass, nutritional status (e.g. meat increases and a vegan diet decreases blood creatinine concentration), clinical conditions which decrease muscle mass (e.g. cancer, paraplegia, amputation), pregnancy which increases GFR and decreases creatinine concentration, and patients with serious comorbid conditions or with metabolically unstable kidney function.

Figure 3 shows that 53% of laboratories were using the recommended isotope dilution mass spectrometry (IDMS) traceable version of the MDRD 4-variable equation. In North America, all major global manufacturers of creatinine methods now have calibration traceable to the IDMS reference measurement procedure. Note that Siemens issued a bulletin in March, 2011 that provided a correction factor to enable reporting IDMS traceable results for the Jaffe methods used with Dimension and Vista analyzers. Consequently, the 39% of laboratories that are still using the original version of the MDRD equation should change to use the IDMS traceable version (2). Continuing to use the original MDRD equation with IDMS traceable methods will cause the eGFR to be 5% too high.



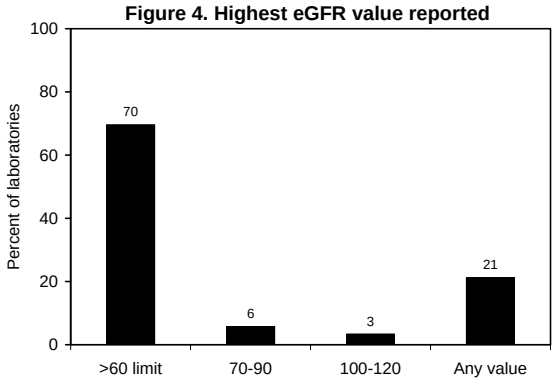


Figure 4 shows that 30% of laboratories are reporting eGFR values above 60 mL/min/1.73 m^2. The MDRD Study equation should not be used to calculate values greater than 60 mL/min/1.73m^2 because the values are biased lower than true GFR measured values. A new equation has been developed by the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) to estimate GFR using IDMS traceable creatinine, age, gender and race (3). The CKD-EPI equation is more accurate than the MDRD equation at values above 60 mL/min/1.73m^2. Figure 3 indicates than only 4% of laboratories are using the CKD-EPI equation. Consequently, most of the laboratories reporting higher numeric values for eGFR are not using an appropriate equation and should change to use the CKD-EPI equation.

It is important to note that there is not a version of the MDRD 6-variable, the Cockcroft-Gault (C-G in Figure 3) or any other adult GFR estimating equation suitable for use with creatinine methods that have calibration traceable to IDMS. IDMS traceable calibration caused a method dependent 5-30% reduction in creatinine concentrations compared to older calibration schemes (4). Thus, when an IDMS traceable creatinine result is used with an older estimating equation, the eGFR will be erroneously high. The amount of the error will vary with the creatinine method used to develop the older equation. Laboratories using an older equation should change to either the IDMS traceable version of the MDRD equation or the CKD-EPI equation.

Additional information on reporting eGFR is available at the NKDEP web site: http://www.nkdep.nih.gov/.

References:

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4. Miller WG, Myers GL, Ashwood ER, et al. Creatinine Measurement: State of the Art in Accuracy and Inter-Laboratory Harmonization. Arch Pathol Lab Med 2005;129:297-304.

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